Construction and Analysis of Landscape Ecological Information Map based on GIS of Xinbin Manchu Autonomous County

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Abstract. The landscape ecology of Xinbin Manchu Autonomous County was qualitatively and quantitatively analyzed by using geographic information map. With the support of GIS, the index pattern of landscape ecological pattern in Xinbin Manchu Autonomous County was obtained by using the spatial analysis and data extraction function of Arcgis and the calculation function of Excel, using the land use remote sensing monitoring data in 1980 and 2020 as the main information source.

Keywords: Information map; Landscape ecology; Xinbin Manchu Autonomous County.

1. Introduction

Xinbin Manchu Autonomous County, located in the eastern part of Liaoning Province, is a mountainous county with "eight mountains, half water, one farmland, half roads and manors". It is 100 km long from east to west, 84 km wide from north to south, 35 km narrow in the middle, with a total area of 4,432 km2.

Xinbin is located at the edge of Changbai Mountain range, and its landform belongs to the middle and low mountainous area of tectonic erosion, with the terrain inclined from northeast to southwest. The three major river basins are the Suzi River basin, Taizi River basin and Fuer River basin, with a total of 1,753 rivers of all sizes. According to the seventh census, as of midnight on November 1, 2020, the permanent population was 217,259. Total jurisdiction 15 towns, 14 state - owned forest farms, 180 administrative villages.

2. Landscape ecological information map

2.1 Data Sources

The induction and extraction of landscape ecological information map in Xinbin Manchu Autonomous County is based on the land use classification map of 1km grid data of Liaoning Province in 1980 and 2020 from China Resources and Environment Database Center.

The remote sensing monitoring data of Xinbin Manchu Autonomous County are obtained through Arcgis cutting processing. All projection systems of this data element are Albers Conic Equal Area projection, and unified central longitude and double standard latitude are adopted. The central longitude is E105° , and the double standard latitude is N25° and N47° respectively. The ellipsoid used is the Krasovsky-1940 ellipsoid. On the Arcgis platform, landscape land use type map is formed through spatial analysis and data extraction of Excel.

2.2 Analysis of operation technical process

Extracting the data , then under the guidance of land types classification principle (Table 1) and in combination with the specific situation of the research region, classifying land using remote sensing monitoring data operation.

The landscape ecological classification system in the study area are to be divided up, comparison reflects 40 years Xinbin Manchu autonomous county of landscape ecological changes, technology process is shown in figure 1.

Table 1. Ground class classification table

| Primary type		Secondary type
(No.)	Name of landscape	Name of ground class（No.）
01	Cultivated landscape	paddy Field (11), dry Land (12)
02	Woodland Landscape	Woodland (21), irrigated woodland (22), open woodland (23), other Woodland (24)
03	Grassland landscape	High coverage grassland (31), medium coverage grassland (32), low coverage grassland (33)
04	Water landscape	River canal (41), lake (42), reservoir pit (43), Permanent glacier and snow (44), tidal flats (45), tidal flats (46)
05	Urban and rural areas, industry and mines, Residential land landscape	Residential land landscape urban land (51), rural settlements (52), other construction land (53),Other Construction Land (06)
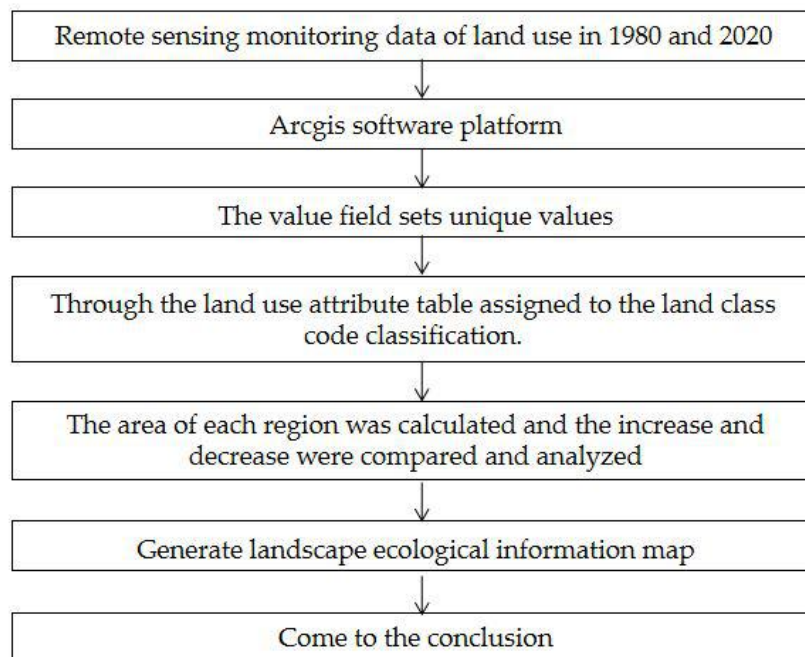
Figure 1.Flow chart of land use type analysis

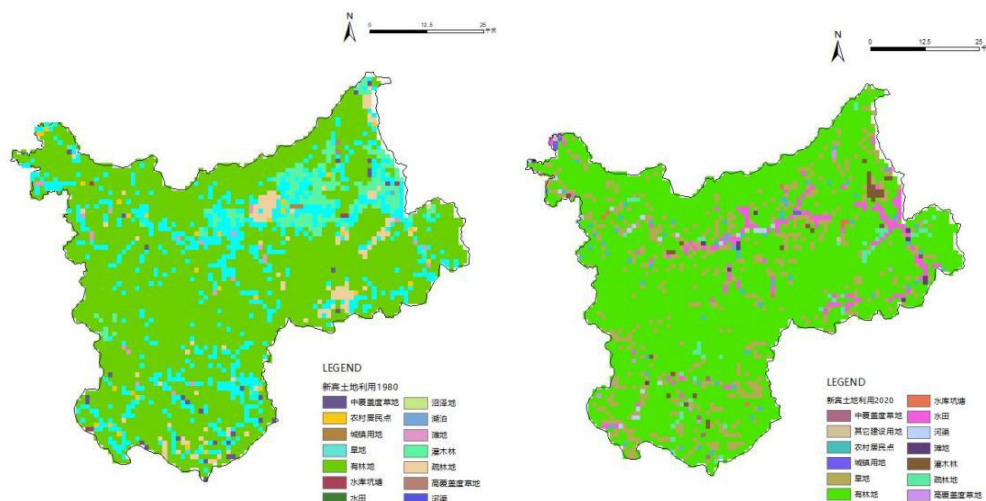## 2.3 Generation of landscape ecological information map

Figure 2. Landscape ecological information map of Xinbin Manchu Autonomous County in 1980 and 2020

3. Analysis of landscape ecological atlas in Xinbin Manchu Autonomous County

3.1 Analysis of change characteristics of landscape ecological information map

In this paper, the change characteristics of landscape ecological information map will be analyzed by comparing the landscape ecological information distribution in 1980 and 2020 (Table 2).

Table 2. Changes of land landscape types in Xinbin Manchu Autonomous County from 1980 to 2020 unit: km2

	Year	Cultivated landscape	Woodland Landscape	Grassland landscape	Water landscape	Urban and rural areas, industry and mines, Residential land landscape	Total
Area	1980	626.330	3533.673	28.888	36.931	32.660	4252.48
	2020	609.688	3534.480	9.300	41.932	67.108	4262.51
Proportion	1980	0.147	0.831	0.007	0.009	0.008	1
	2020	0.143	0.829	0.002	0.010	0.016	1
Changing Area	-	-16.642	0.807	-19.588	5.001	34.448	10.03
Changing Proportion	-	-2.66%	0.02%	-67.81%	13.54%	105.47%	0.24%
Perimeter	1980	1712.216	2147.554	121.377	118.073	131.136	4230.36
	2020	1804.541	2216.112	42.250	157.978	271.112	4491.99

In terms of area, among the land landscape utilization types of Xinbin Manchu Autonomous County in the past 40 years, the area of woodland landscape, grassland landscape, water landscape and urban and rural industrial and mining residential landscape has increased, while other landscape areas have decreased. The landscape area of industrial and mining residential areas in urban and

rural areas increased most obviously, from 32.660km2 in 1980 to 67.108km2 in 2020, with an increase rate of 105.47%.

According to the land use planning objectives of Xinbin Manchu Autonomous County in the past 15 years, protecting cultivated land and rationally increasing construction land are two important items. The fact that the quantity of cultivated land remains relatively stable and the landscape of urban and rural industrial and mining areas increases greatly shows that the planning is well implemented. The ecological land needs to be effectively protected. Xinbin Manchu Autonomous County is positioned as an important water source protection area and ecological protection area in Liaoning Province.

The increase of water area also indicates the effective implementation of the objectives of the plan. The area of forestland landscape was the largest landscape in 1980, and it increased slightly in 2020. The growth rate of shrubbery is more than 6 times of itself, which proves that people are really protecting the ecological environment. In terms of area change ratio, the area change ratio of urban and rural industrial and mining residential landscape and water landscape is the largest, indicating that these two landscapes are greatly affected by human activities.

4. Conclusion

According to the data of various indicators, woodland landscape has the largest area proportion, which is the key landscape type of Xinbin Manchu Autonomous County, so as to maintain the balance of the county's ecosystem and make the ecological environment in a good state. From 1980 to 2020, all kinds of landscapes in Xinbin Manchu Autonomous County showed a trend of relatively concentrated changes. This is a reflection of human activity and the intensification of government planning in recent years.

On the whole, landscape ecology in Xinbin Manchu Autonomous County is in good condition. There is a large proportion of woodland landscape to maintain the balance of ecosystem, but the proportion of grassland landscape and water landscape is small, which needs to be further increased. From the perspective of the change area in the past 40 years, the area of cultivated land has declined, and the work of returning cultivated land to forest has achieved remarkable results. The problem is that the proportion of water landscape is still small, so we need to strengthen the development.

Acknowledgments

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